

PCT

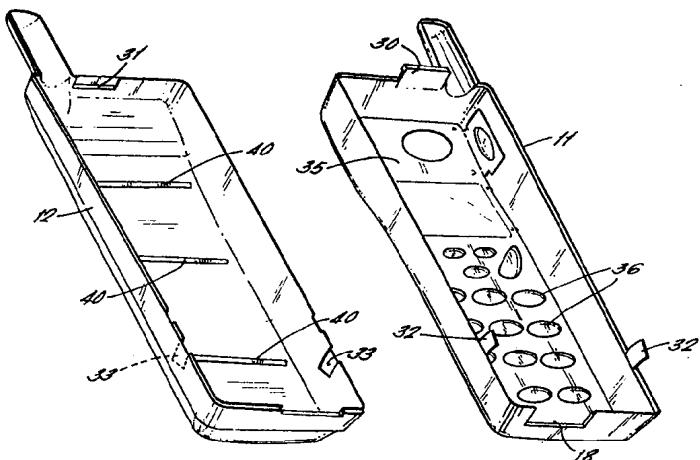
WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : H04B 1/38		A1	(11) International Publication Number: WO 00/13330
			(43) International Publication Date: 9 March 2000 (09.03.00)
(21) International Application Number: PCT/GB99/02873		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 1 September 1999 (01.09.99)			
(30) Priority Data: 9819029.1 1 September 1998 (01.09.98) GB			
(71) Applicant (for all designated States except US): MANPUS MOULDINGS LIMITED [GB/GB]; 1 Brixham Enterprise Estate, Rea Barn Road, Brixham, Devon TQ5 9DF (GB).			
(72) Inventor; and		Published	
(75) Inventor/Applicant (for US only): DAWKINS, Derek [GB/GB]; Tecton, Lower Warberry Road, Torquay TQ1 1QT (GB).		With international search report.	
(74) Agent: BOULT WADE TENNANT; 27 Furnival Street, London EC4A IPQ (GB).			

(54) Title: A MOBILE TELEPHONE CARRYING CASING



(57) Abstract

The present invention provides (with reference to Figure 1) a mobile telephone carrying casing (10) which can encase, contain and protect a mobile telephone carried thereby. The carrying casing (10) is an integer separate and independent from the carried mobile telephone which consists wholly or principally of a rigid plastics material. The carrying casing (10) comprises at least two parts defining front and rear components (11, 12), the front component (11) encasing the front face of the mobile telephone and the rear component (12) encasing the rear face of the mobile telephone. The front and rear components (11, 12) meet in a line spaced apart from the front and rear faces of these components. The carrying casing (10) allows a user to operate the encased mobile telephone whilst carried in the carrying casing (10). The carrying casing (10) may additionally comprise electromagnetic radiation screening means to attenuate electromagnetic radiation. The present invention also provides a method of encasing, containing and protecting a mobile telephone, and of screening electromagnetic radiation emitted by the mobile telephone.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

- 1 -

A MOBILE TELEPHONE CARRYING CASING

The present invention relates to a mobile telephone carrying casing.

5

In the past it has been recognised that the exterior of a mobile telephone is subject to considerable wear and tear in use. To improve the situation, mobile telephone carrying casings have been produced which encase the mobile telephone and offer some protection against wear and tear. The mobile telephone carrying casings also help prevent the mobile telephone encased in the carrying casing from becoming dirty. The carrying casings tend to be fairly low-cost items which can be replaced periodically. To date, mobile telephone carrying casings have typically been made of either leather or imitation leather. While these mobile telephone carrying casings do offer some protection to the mobile telephones encased therein, they are themselves not particularly hardwearing. In addition, the use of leather or imitation leather restricts the choice of colour and design. Furthermore, the carrying casings in current use do not significantly inhibit the escape of electromagnetic radiation or other potentially harmful waveforms.

The present invention provides, in a first aspect, a mobile telephone carrying casing which can encase, contain and protect a mobile telephone carried thereby, wherein:

the casing is an integer separate and independent from the carried mobile telephone which consists wholly or principally of a rigid plastics material;

35 the casing comprises at least two parts, defining

- 2 -

front and rear components, the front component
encasing the front face of the mobile telephone and
the rear component encasing the rear face of the
mobile telephone, the components meeting in a line
5 spaced apart from the front and rear faces of these
components; and

the casing allows a user to operate the encased
mobile telephone whilst carried in the casing.

10 Preferably, no part of the encased mobile
telephone extends beyond the carrying casing.
Preferably, the front and rear components meet in a
plane substantially parallel to the front and rear
faces.

15 15 Preferably, the front and rear components are
attached by connecting means. Preferably, the
connecting means include hinges.

20 20 Preferably, the two parts of the mobile telephone
carrying casing are releasably attached by connecting
means. Preferably, the connecting means comprises one
or more clips located on one or more of the components
which fasten to opposing mating hooks or recesses
25 provided on another component.

Advantageously, the connecting means comprises a
tongue and groove arrangement, with one or more
tongues provided on one or more of the components
30 which are slidably held in one or more grooves
provided on another component.

35 Preferably, the carrying casing is provided with
electromagnetic radiation screening means. Preferably,
the electromagnetic radiation screening means provides

- 3 -

a shield positioned between a head of a user and the
encased mobile telephone. Preferably, the
electromagnetic radiation screening means causes
attenuation of the electromagnetic radiation only on
5 the side of the casing nearest a head of a user, the
electromagnetic radiation being free to radiate from
the remainder of the casing without attenuation.

Advantageously, the electromagnetic radiation
10 screening means is selectively incorporated in one or
more desired regions of the casing.

Preferably, the electromagnetic radiation
screening means comprises a coating on one or more
15 surfaces of one or more of the components of the
carrying casing. Preferably, the coating comprises
metallic particles. Advantageously these metallic
particles are nickel, copper, silver, or gold.
Preferably the coating comprises metallic particles
20 which are alloys of two or more metals. Preferably,
the coating is a paint. Preferably, the coating is
sprayed on a surface of the carrying casing.

In a further preferred embodiment, the
25 electromagnetic radiation screening means comprises a
mesh. Preferably, the mesh comprises a metal or an
alloy of metal. Advantageously, the mesh comprises a
composite material. Preferably, the mesh comprises
apertures whose maximum dimension is less than one
30 half of a wavelength of the smallest wavelength
electromagnetic radiation emitted by the carried
mobile telephone.

Preferably, the electromagnetic radiation
35 screening means provided in the casing forms a screen

- 4 -

between a head of a user and the sources of electromagnetic radiation in the carried mobile telephone.

5 Preferably, the electromagnetic radiation screening means is selectively positioned in the casing so that it does not impair the function of the mobile telephone.

10 Advantageously, the mobile telephone carrying casing comprises an aperture for alignment with an earpiece of the mobile telephone carried thereby. Preferably, a mobile telephone carrying casing comprises an aperture for alignment with a microphone of a mobile telephone carried thereby. Preferably, the mobile telephone carrying casing comprises an aperture through which volume control keys of the carried mobile telephone are accessible. In a preferred embodiment, the mobile telephone carrying casing comprises an aperture through which a display screen of the carried mobile telephone can be viewed.

15 Preferably, the mobile telephone carrying casing comprises an aperture through which an aerial from a mobile telephone can project. Preferably, the mobile telephone carrying casing comprises an aperture through which the mobile can be recharged.

20 Preferably, at least one of the above mentioned apertures is shielded by at least one cover. Preferably, these covers are retractable. Advantageously, these covers are provided with electromagnetic radiation screening means to attenuate electromagnetic radiation.

- 5 -

Preferably, the mobile telephone carrying casing is injection moulded from a thermo-plastic, such as ABS or ABS/Polycarbonate blend.

5 In a further preferred embodiment, the mobile telephone carrying casing comprises a membrane key pad and a number of apertures through which the membrane key pad can project, thus enabling activation of the keys located on the encased mobile telephone by depression of the keys on the membrane key pad.

10 Preferably, the membrane key pad is attached to the remainder of the carrying casing. Preferably, at least one of the apertures is shielded by at least one cover. Preferably, the cover is retractable.

15 Preferably, the membrane keypad is provided with electromagnetic radiation screening means to attenuate electromagnetic radiation.

20 Preferably, at least one of the exterior surfaces of the mobile telephone carrying casing contains grooves which ease gripping and thus opening of one component of the casing from another component of the casing.

25 Advantageously, the mobile telephone carrying casing comprises attachment means for attaching the carrying casing to clothing of a user. Preferably, the attachment means can attach the carrying casing to a belt of the user, or to a holster located in a fixed place, such as the dashboard of a car.

35 In a second aspect, the present invention provides a mobile telephone carrying casing which can encase, contain, and protect a mobile telephone

- 6 -

carried thereby, wherein:

the casing is an integer separate and independent from the carried mobile telephone which consists wholly or principally of a rigid plastics material;

5 the casing comprises at least two parts which can be separated to allow introduction of a mobile telephone between the parts and joined together to encase the introduced mobile telephone;

10 at least one part is provided with electromagnetic radiation screening means; and

the casing allows a user to operate the encased mobile telephone whilst carried in the casing.

15 Preferably, the electromagnetic radiation screening means provides a shield positioned between a head of a user and the encased mobile telephone.

20 Preferably, the electromagnetic radiation screening means causes attenuation of the electromagnetic radiation only on the side of the casing nearest a head of a user, the electromagnetic radiation being free to radiate from the remainder of the casing without attenuation.

25 Preferably, the at least two casing parts define front and rear components, the front component enclosing the front face of the mobile telephone and the rear component enclosing the rear face of the mobile telephone, the components meeting in a line spaced apart from the front and rear faces of these components.

30 Preferably, the electromagnetic shielding means comprises a coating on a surface of one of the parts.

- 7 -

Preferably, the coating comprises an RF conductive coating. Preferably the coating is sprayed on a interior surface.

5 In a third aspect of the present invention, there is provided use of the mobile telephone carrying case described above to encase, contain and protect a mobile telephone, the mobile telephone already having a casing which is an integral part of the mobile
10 telephone.

In a fourth aspect of the present invention, there is provided a method of encasing, containing and protecting a mobile telephone, and of screening
15 electromagnetic radiation emitted by the mobile telephone, the method comprising the steps of:

providing a carrying casing which is an integer separate and independent from the carried mobile telephone which consists wholly or principally of a
20 rigid plastics material, the casing comprising at least two separable parts having connecting means and an electromagnetic screening means,

separating the casing into the at least two parts;

25 introducing the mobile telephone to be carried into one of the separated parts; and

joining the at least two parts to encase the mobile telephone and using the connecting means to secure the casing; wherein:

30 the method allows a user to operate the mobile telephone whilst carried in the casing; and

the electromagnetic screening means attenuates electromagnetic radiation emitted by the carried mobile telephone.

It should be appreciated that when the word rigid is used in the specification, it does not imply that the material is completely rigid, and instead the material can have some flexibility provided that it is capable of being self-supporting and is certainly more rigid than a sheet of leather or a sheet of imitation leather; i.e. it is not a pliable sheet material.

The mobile telephone carrying casing provided by the present invention is both sturdy and hard wearing to protect the encased mobile telephone against wear and tear, and also offers a large variety of alternatives in terms of colour and design. The carrying casing may additionally incorporate screening means to inhibit the escape of electromagnetic radiation generated by a carried mobile telephone in the direction of a user.

Preferred embodiments of the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a mobile telephone carrying casing according to a first embodiment of the present invention;

Figure 2 is a perspective view of the mobile telephone carrying casing of Figure 1, showing the carrying casing separated into two parts;

Figure 3 is a different perspective view of the two separated parts of the mobile telephone carrying casing of Figures 1 and 2, showing the interior surfaces of the carrying casing parts;

Figure 4 is a detail perspective view of the lower portion of a rear part of carrying casing according to the present invention, showing an alternative clip arrangement used to releasably join

- 9 -

the two parts of the carrying casing;

Figure 5 shows in detail the two carrying casing parts joined together using the clip arrangement of Figure 4;

5 Figure 6 is a top plan view of the mobile telephone carrying casing of Figures 1 to 3;

Figure 7 is a side elevation view of the mobile telephone carrying casing of Figures 1 to 3 and 6;

10 Figure 8 is a front elevation view of the mobile telephone carrying casing of Figures 1 to 3, 6 and 7;

Figure 9 is a rear perspective view from above of the mobile telephone carrying casing of Figures 1 to 3 and 6 to 8;

15 Figure 10 is plan view of a membrane key pad which may be inserted or attached to a mobile telephone carrying casing according to the present invention;

20 Figure 11 is a perspective view of the separated parts of a mobile telephone carrying casing before assembly, shown with the rear part carrying a mobile telephone; and

25 Figure 12 is a perspective view of the mobile telephone carrying casing of Figure 11, together with the membrane key pad of Figure 10, shown carrying the mobile telephone.

Referring first to Figure 1, the present invention can be seen to comprise a mobile telephone carrying casing 10 which is formed of rigid plastics material, most preferably from ABS (Acrylonitrile Butadiene Styrene) plastic, or an ABS/Polycarbonate blend, which is a tough material with good resistance to impact, even at low temperatures, and which can be printed on without pretreatment. In this particular embodiment, as can best be seen in Figure 12, the

- 10 -

carrying casing 10 can be seen to fully encase a carried mobile telephone 50 so that no part of the mobile telephone 50 extends beyond the carrying casing 10. In fact, the mobile telephone carrying casing 10 comprises essentially two parts, a front component 11 and a rear component 12, which meet and can be releasably joined in a line spaced apart from the front and rear faces of these components 11, 12. Although the join between the front and rear components 11, 12 is shown to be a straight line, this need not necessarily be so and may instead be, for example, of castellated or sinusoidal form.

Figures 2 and 3 show the mobile telephone carrying casing 10 separated into its two parts, front component 11 and rear component 12. Numerous apertures are visible, some defined by the joining of the components 11, 12. For example, aperture 15 allows the display screen of a mobile telephone (not shown) to be viewed. Apertures 16, 17 may be used for alignment with a microphone or earpiece of a mobile telephone. Aperture 18 may be used to give access to the base of a mobile telephone for recharging a battery or for connecting an accessory such as a hands-free lead. Aperture 19 may be used to give access to volume control keys or other function keys of a mobile telephone. Aperture 20 enables a function light of a mobile telephone to be viewed. Apertures 25 allow the membrane key pad 35 of Figure 10 to protrude therethrough enabling activation of the keys 36 of the membrane key pad 35. The membrane key pad 35 protects the keys of a mobile telephone which are relatively expensive and complicated to replace, unlike those of the membrane key pad 35.

- 11 -

In order to fully encase and protect a carried mobile telephone 50, the apertures provided in the carrying casing 10 may be provided with shields or removable covers. Aperture 15, in particular, may be
5 fitted with a transparent shield 21 to protect the display unit of a mobile telephone. Alternatively, the membrane key pad 35 may incorporate a protective translucent portion 37 to overlay the display unit of a mobile telephone. All other apertures 16, 17, 18,
10 19, 20 may be provided with removable covers (not shown). These covers may, for example, be manufactured from a resilient pliable material such as rubber or silicone and shaped for effective sealing upon insertion into the respective apertures 16, 17,
15 18, 19, 20.

It will be appreciated that the internal surfaces of the mobile telephone carrying casing 10 must conform to the external shape of a carried mobile telephone 50. Therefore, each carrying casing 10 is specific to one particular model of mobile telephone, there being different carrying casing 10 versions available for each model of mobile telephone (unless, of course, different models of mobile telephone are
25 substantially similar geometrically). Accordingly, apertures 15, 16, 17, 18, 19, 20, 25 will vary in number, shape and position on different versions of the carrying casing 10 to accommodate the range of different mobile telephones available. Also, in an alternative embodiment, the carrying casing 10 may be provided with additional apertures to enable parts of a mobile telephone to extend therethrough, such as, 30 for example, an extendable antenna.

35 The front and rear components 11, 12 may be

- 12 -

connected in several ways. In Figures 2, 4 and 5, the carrying casing 10 is simply provided with clips 30 which locate in corresponding recesses provided in the opposing component. A plurality of clips 30 may be
5 provided to join the rear component 12 to the front component 11 at various locations along the mating edges. The clips 30 may of course project from the mating edges of either one of the front component 11 or rear component 12, or indeed both, as long as they
10 are suitably positioned with respect to receiving recesses in the opposing component. As can best be seen in Figures 4 and 5, clips 30 are shown to be a moulded part of the front or rear component 11, 12, although only joined to the respective component 11,
15 12 along the base of clip 30. The outer surface of clip 30 may be provided with grooves 35 which ease gripping of the clip 30. Thus, depression of clip 30 at a location 28 will move the head 27 of clip 30 out of the recess and thus disengage clip 30, allowing for
20 separation of front and rear components 11, 12 respectively.

Alternatively, as can be seen in Figure 3, a clip 30, tabs 32 and corresponding recesses 31, 33 are
25 provided. Clip 30 is conveniently located on the front component 11 towards the top of the carrying casing 10. A corresponding recess 31 is provided on rear component 12 in which clip 30 locates. Tabs 32 are used in conjunction with recesses 33 to provide an
30 interlocking arrangement which permits the carrying casing parts 11, 12 to be brought together into abutment at a portion below tabs 32, whereupon the carrying casing parts 11, 12 are rotated towards each other so as to close the carrying casing 10. When
35 fully closed, clip 30 is received by recess 31 and

- 13 -

thus holds the front and rear components 11, 12 in a closed condition until clip 30 is released from recess 31 as described above.

5 Alternative connecting means may be used in conjunction with, or instead of, clips 30 or tabs 32. For example, a tongue and groove arrangement may be employed by providing the edges of the respective front and rear components 11, 12 with portions or
10 continuous lengths of respective protrusions and recesses such that the two components 11, 12 may be brought together into abutment in a perpendicular direction, and then slid in opposite longitudinal directions so as to interlock. Additionally, a clip
15 30 or button may be provided which is activated when the two components 11, 12 are fully interlocked. Such an arrangement is well known in the art for attaching a battery to a mobile telephone. Alternatively, hinges may be used in conjunction with clips 30, 32.
20

As can be seen in the Figures, and as described above, the inside of the carrying casing 10 generally conforms to the shape of a mobile telephone such that there is limited relative movement between the encased
25 mobile telephone 50 and the carrying casing 10. Optionally, as can be seen in Figures 3 and 4, a number of ridges 40 may be provided on the internal surface of the rear component 12. These aid in securing a mobile telephone within the carrying casing
30 10. In addition, their limited contact area with the mobile telephone reduces the amount of conduction of heat away from the mobile telephone and to the user via the carrying casing 10, thus increasing comfort for the user, particularly during extended periods of
35 use. Furthermore, air which is present in the space

between the mobile telephone and the carrying casing 10 may provide for convection of heat away from the mobile telephone.

5 The mobile telephone carrying casing 10 is more resistant to wear than leather or imitation leather carrying casings known in the art, and can be made of many different colours and designs. Thus, the carrying casing 10 of the present invention can be
10 made aesthetically pleasing.

In particular, the rigid plastics material of the carrying casing 10 can be printed on without pretreatment, enabling a number of surface finish treatments to be applied following manufacture. These treatments may include spraying or dipping the front and rear components 11, 12 in paint or applying decals or transfers. Alternatively, the carrying casing 10 may simply be produced in a desired colour by
15 selection of appropriately coloured raw materials, or by applying a colouring during the manufacturing process. Also, recently developed techniques enable intricate and vivid artworks to be applied to moulded plastics articles as part of a mass manufacturing
20 process. One such process is that of Keytech and is the subject of UK patent number 2120169. The Keytech process is a thermostatic printing process which enables a sharply detailed, vibrant multicolour artwork to be reproduced exactly and repeatedly.
25 Multiple colour dyes are applied using heat and pressure to penetrate up to 6 mils into the carrying casing 10 with precise registration and clarity. The resulting artwork impregnates the carrying casing 10 in such a way that it is indelible and therefore
30 extremely resistant to scratching and general wear and
35

- 15 -

tear experienced by the carrying casing 10.

Referring now to Figures 6, 7 and 9, the mobile telephone carrying casing 10 can be seen to be provided with an attachment means 45 on, for example, the rear component 12 to enable attachment to clothing of a user. For instance, the attachment means 45 may comprise a hook or belt clip which could be provided on the rear component 12 in order to enable the carrying casing 10 to be hooked onto a belt of a user or to a holster located in a fixed place, such as the dashboard of a car.

In the embodiment shown, a mobile telephone will be removed from the carrying casing 10 when a battery needs replacing, although it would be possible to design a carrying casing 10 with an aperture in the rear component 12 permitting battery replacement. Furthermore, the rear component 12 may itself be made in two portions such that one portion may be designed to cover the battery. This battery covering portion would then be easily removable in its entirety, or may be moved out of the way by the use of a hinge or sliding arrangement attaching it to the remaining portion of the rear component 12. This would facilitate quick and easy removal and replacement of a battery. Likewise, the front component 11 may also be formed of separate attachable portions so as to facilitate access to the keys, display screen or other functions of a mobile telephone which would otherwise be encased.

The front and/or rear components 11, 12 may additionally provide a screening function so as to limit exposure of a user to electromagnetic radiation

- 16 -

generated by a mobile telephone. The effects upon the human body of electromagnetic radiation generated by mobile telephones has been the subject of considerable debate. It has been intimated that emissions from 5 mobile telephones may be detrimental to human health. In the absence of conclusive evidence either way, the applicant considers it prudent to limit exposure of a user by incorporating materials known to be effective in screening electromagnetic radiation within parts of 10 the carrying casing 10.

The applicant has established in tests that coating the carrying casing 10 with an RF (radio frequency) conductive paint comprising metallic 15 particles such as nickel, copper, silver, gold or mixtures or alloys thereof is effective in attenuating the field strength of electromagnetic radiation measured at near and far field locations by up to approximately 70 to 90%. In particular, a nickel 20 coating was found to attenuate the electromagnetic radiation field strength by up to 90%.

There are two key parameters to consider when providing an effective screening coating; the 25 conductivity and the thickness of the coating. The greater the conductivity of the coating, the greater the attenuation of electromagnetic radiation. Also, for the coating to be effective, there must be a deposit of at least one 'skin depth' (i.e. at least 30 one particle thickness) of coating. Typically, the carrying casing 10 is provided with a coating thickness in the range of 25-50 μm , which provides up to 10 skin depths dependent upon the size of particle used in the coating.

- 17 -

To ensure good screening, the entire interior surface of front component 11 is covered with conductive paint, typically by spray coating. It is preferable to cover the interior surface with paint since it is less liable to wear and because the paint does not interfere with aesthetic exterior surface coatings which can be applied. The inward facing surface of the membrane key pad 35 can also be covered with conductive paint to minimise electromagnetic radiation emissions from the carrying casing 10.

Likewise, any shield 21 or covers provided for apertures 15, 16, 17, 18, 19, 20 may be coated with conductive paint. However, even if left uncoated, certain apertures (e.g. 17, 18) do not necessarily compromise the integrity of the screening provided by the conductive paint. The critical parameter is the dimension of one half of a wavelength of the electromagnetic radiation generated by a mobile telephone. Electromagnetic radiation cannot pass through a screening element having apertures whose maximum dimensions are less than one half of the wavelength of the shortest wavelength electromagnetic radiation. Screening elements such as nickel wire mesh and other metallic meshes exploit this physical characteristic in applications such as the doors of microwave ovens. In such an application, electromagnetic radiation is substantially contained within the oven by the mesh contained within the door, yet it is possible to look through the mesh to see inside the oven. Electromagnetic radiation emitted by mobile telephones is typically in the frequency range 500 Mhz to 2 Ghz, but is preferably 950 Mhz or 1.5 Ghz. Corresponding electromagnetic radiation wavelengths fall in the range of 0.01 to 0.02m. Thus, an aperture in the conductive paint of less than

0.005m will not compromise the attenuation achieved.

It is most important to coat the front component 11 since this faces a head of a user and provides a shield directly between the source of the electromagnetic radiation and the head of a user. Whilst it is preferable that the inner surfaces of front component 11 and associated shield 21 and covers be coated in order to minimise damage to the coating, screening is equally effective when the coating is applied to the corresponding outer surfaces, either instead of, or as well as, a coating applied to interior surfaces.

Whilst field strengths and electromagnetic radiation emissions vary from mobile telephone to mobile telephone, it is generally understood that the primary sources of radiation are the antenna and the power pack of a mobile telephone. By completely coating the front component 11, the membrane keypad 35, and the shield 21 of aperture 15, the head of the user is entirely screened from the sources of electromagnetic radiation. Whilst this arrangement provides effective screening in the direction of the head of the user, signals may be emitted and received via the unscreened rear component 12 without attenuation. This directional screening solves the problem experienced by prior art screening devices which seek to contain overall electromagnetic radiation emissions from a mobile telephone which can, in turn, result in overheating of the mobile telephone, loss of signal strength, loss of operating range, reduced battery life and poor sound quality.

Additional reductions in electromagnetic radiation

- 19 -

emissions can also be achieved in the carrying casing
10 of the present invention by selectively coating
areas of the interior surfaces of rear component 12.
It has been found that coating the entire internal
5 surface of component 11 and partial coating of rear
component 12, whilst limiting the electromagnetic
radiation received by a head and hand of a user, does
not impair the functioning of a mobile telephone
encased by the carrying casing 10.

10

It will be appreciated, therefore, that selective
screening of the carrying casing 10 is possible so as
to provide effective screening of electromagnetic
radiation in the direction of a user without
15 experiencing the impaired mobile telephone function
associated with prior art devices.

20

Whilst in the embodiment described above
electromagnetic radiation screening is provided by
means of a coating of conductive paint, other forms of
screening element could be used. For example,
effective screening could alternatively be provided in
the form of a layer of mesh material which is embedded
within the carrying casing 10 during moulding. Also,
25 particulate materials may be added to the raw
materials before or during manufacture so as to form a
matrix of screening elements throughout the carrying
casing 10. It will be appreciated that the carrying
casing 10 may be selectively screened as described
30 above using these alternative elements. A mesh or
matrix of screening elements may also be provided
within the shield 21 or covers used for apertures 15,
16, 17, 18, 19, 20, 25 or within the membrane key pad
35. This is particularly advantageous where it is
important for a user to view underlying information

35

- 20 -

displayed on or by the encased mobile telephone 50 which would otherwise be covered by an opaque coating of conductive paint.

5 It will be appreciated that many modifications may be made to the above described embodiments of the present invention without departing from the scope of the invention. For example, new electromagnetic radiation screening technologies may be implemented
10 within the carrying casing 10. New designs of mobile telephone with substantially different geometries, such as flip phones, can be catered for with suitable amendment to the geometry of carrying casing 10.
Also, it will be appreciated that the carrying casing
15 10 could be split into upper and lower components as opposed to front and rear components. Such an arrangement may be especially desirable when a mobile telephone to be encased is of substantially continuous cross section so as to permit its introduction into
20 the two or more components of the carrying casing 10.

- 21 -

CLAIMS

1. A mobile telephone carrying casing which can encase, contain and protect a mobile telephone carried thereby, wherein:

5 the casing is an integer separate and independent from the carried mobile telephone which consists wholly or principally of a rigid plastics material;

10 the casing comprises at least two parts, defining front and rear components, the front component enclosing the front face of the mobile telephone and the rear component enclosing the rear face of the mobile telephone, the components meeting in a line spaced apart from the front and rear faces of these 15 components; and

the casing allows a user to operate the encased mobile telephone whilst carried in the casing.

2. A mobile telephone carrying casing as claimed in 20 claim 1 wherein no part of the encased mobile telephone extends beyond the casing.

3. A mobile telephone carrying casing as claimed in claim 1 or claim 2 wherein the front and rear 25 components meet in a plane substantially parallel to the front and rear faces.

4. A mobile telephone carrying casing as claimed in claim 1 or claim 2 wherein the meeting line between 30 front and rear components is non-linear.

5. A mobile telephone carrying casing as claimed in claim 4 wherein the non-linear meeting line is of castellated form.

- 22 -

6. A mobile telephone carrying casing as claimed in any one of the preceding claims wherein the front and rear components are attached by connecting means.

5 7. A mobile telephone carrying casing as claimed in claim 6 wherein the front and rear components are releasably attached by the connecting means.

10 8. A mobile telephone carrying casing as claimed in claim 6 or claim 7 wherein the connecting means includes hinges.

15 9. A mobile telephone carrying casing as claimed in any one of claims 6 to 8 wherein the connecting means comprises one or more clips located on one or more of the components which releasably fasten to opposing mating hooks or recesses provided on another component.

20 10. A mobile telephone carrying casing as claimed in claim 6 wherein the connecting means comprises a tongue and groove arrangement, with one or more tongues provided on one or more of the components which are slidably held in one or more grooves provided on another component.

25 30 11. A mobile telephone carrying casing as claimed in claim 10 wherein the connecting means further comprises one or more clips located on one or more of the components which releasably fasten to opposing mating hooks or recesses provided on another component.

35 12. A mobile telephone carrying casing as claimed in any one of the preceding claims wherein the rear

component comprises a removable panel which allows access to the interior of the casing when the front and rear components are joined together.

5 13. A mobile telephone carrying casing as claimed in any one of the preceding claims wherein the front component comprises a removable panel which allows access to the interior of the casing when the front and rear components are joined together.

10 14. A mobile telephone carrying casing as claimed in any one of the preceding claims wherein at least one component is provided with electromagnetic radiation screening means which attenuates electromagnetic radiation.

15 15. A mobile telephone carrying casing as claimed in claim 14 wherein the electromagnetic radiation screening means provides a shield positioned between a head of a user and the encased mobile telephone.

20 16. A mobile telephone carrying casing as claimed in claim 14 or claim 15 wherein the electromagnetic radiation screening means causes attenuation of the electromagnetic radiation only on the side of the casing nearest a head of a user, the electromagnetic radiation being free to radiate from the remainder of the casing without attenuation.

25 17. A mobile telephone carrying casing as claimed in any one of claims 14 to 16 wherein the electromagnetic radiation screening means is selectively incorporated in one or more desired regions of the casing.

30 18. A mobile telephone carrying casing as claimed in

any one of claims 14 to 17 wherein the electromagnetic screening means comprises a coating applied to a surface of one or more of the components of the casing.

5

19. A mobile telephone carrying casing as claimed in claim 18 wherein the coating contains metallic particles.

10

20. A mobile telephone carrying casing as claimed in claim 19 wherein the metallic particles are nickel.

21. A mobile telephone carrying casing as claimed in claim 19 wherein the metallic particles are copper.

15

22. A mobile telephone carrying casing as claimed in claim 19 wherein the metallic particles are silver.

20

23. A mobile telephone carrying casing as claimed in claim 19 wherein the metallic particles are gold.

24. A mobile telephone carrying casing as claimed in claim 19 wherein the metallic particles are alloys of two or more metals.

25

25. A mobile telephone carrying casing as claimed in claim 24 wherein the metallic particles are alloys of nickel and copper.

30

26. A mobile telephone carrying casing as claimed in claim 24 wherein the metallic particles are alloys of nickel and silver.

35

27. A mobile telephone carrying casing as claimed in claim 24 wherein the metallic particles are alloys of

- 25 -

nickel and gold.

28. A mobile telephone carrying casing as claimed in
claim 24 wherein the metallic particles are alloys of
5 copper and silver.

29. A mobile telephone carrying casing as claimed in
claim 24 wherein the metallic particles are alloys of
copper and gold.

10

30. A mobile telephone carrying casing as claimed in
claim 24 wherein the metallic particles are alloys of
silver and gold.

15

31. A mobile telephone carrying casing as claimed in
any one of claims 18 to 30 wherein the coating is a
paint.

20

32. A mobile telephone carrying casing as claimed in
any one of claims 18 to 31 wherein the coating is
sprayed on a surface of one more components.

25

33. A mobile telephone carrying casing as claimed in
claim 32 wherein the coating is sprayed on an interior
surface one or more components.

30

34. A mobile telephone carrying casing as claimed in
any one of claims 18 to 31 wherein the coating is
sprayed on a plurality of surfaces of one or more
components.

35. A mobile telephone carrying casing as claimed in
any one of claims 14 to 17 wherein the electromagnetic
radiation screening means comprises a mesh.

35

- 26 -

36. A mobile telephone carrying casing as claimed in
claim 35 wherein the mesh comprises a metal.

5 37. A mobile telephone carrying casing as claimed in
claim 35 wherein the mesh comprises an alloy of metal.

38. A mobile telephone carrying casing as claimed in
claim 35 wherein the mesh comprises a composite
material.

10

39. A mobile telephone carrying casing as claimed in
any one of claims 35 to 38 wherein the mesh comprises
apertures whose maximum dimension is less than one
half of a wavelength of the smallest wavelength
15 electromagnetic radiation emitted by the carried
mobile telephone.

20

40. A mobile telephone carrying casing as claimed in
any one of claims 14 to 39 wherein the electromagnetic
radiation screening means provided in the casing forms
a screen between a head of a user and the sources of
electromagnetic radiation in the carried mobile
telephone.

25

41. A mobile telephone carrying casing as claimed in
any one of claims 14 to 40 wherein the electromagnetic
radiation screening means is selectively positioned in
the casing so that it does not impair the function of
the mobile telephone.

30

42. A mobile telephone carrying casing as claimed in
any one of the preceding claims which comprises an
aperture for alignment with an earpiece of the mobile
telephone carried thereby.

35

- 27 -

43. A mobile telephone carrying casing as claimed in any one of the preceding claims which comprises an aperture for alignment with a microphone of a mobile telephone carried thereby.

5

44. A mobile telephone carrying casing as claimed in any one of the preceding claims which comprises an aperture through which function keys of the carried mobile telephone are accessible.

10

45. A mobile telephone carrying casing as claimed in any one of the preceding claims which comprises an aperture through which a display screen of the carried mobile telephone can be viewed.

15

46. A mobile telephone carrying casing as claimed in claim 1 or any one of claims 3 to 45 which comprises an aperture through which an antenna of the carried mobile telephone can project.

20

47. A mobile telephone carrying casing as claimed in any one of the preceding claims which comprises an aperture through which the mobile telephone can be recharged.

25

48. A mobile telephone carrying casing as claimed in claims 42 to 47 wherein at least one of the apertures is shielded with a cover.

30

49. A mobile telephone carrying casing as claimed in claim 48 wherein the cover is retractable or removable.

35

50. A mobile telephone carrying casing as claimed in claim 48 or claim 49 wherein the cover is provided

with electromagnetic radiation screening means to attenuate electromagnetic radiation.

51. A mobile telephone carrying casing as claimed in
any one of the preceding claims which comprises
components injection moulded from a thermoplastic.

52. A mobile telephone carrying casing as claimed in
any one of the preceding claims which has components
10 at least partially composed of Acrylonitrile Butadiene
Styrene.

53. A mobile telephone carrying casing as claimed in
any one of the preceding claims which has components
15 at least partially composed of a polycarbonate
material.

54. A mobile carrying casing as claimed in any one of
the preceding claims which comprises a membrane key
20 pad composed of a flexible material, which overlays
the keys of an encased mobile telephone and which has
keys which project through apertures in the casing,
thus enabling activation of the keys of the encased
mobile telephone by depression of the keys of the
25 membrane key pad.

55. A mobile telephone carrying casing as claimed in
claim 54 wherein the membrane key pad is attached to
the remainder of the casing.

30 56. A mobile telephone carrying casing as claimed in
claim 54 or claim 55 wherein the membrane key pad is
at least partially shielded by at least one cover.

35 57. A mobile telephone carrying casing as claimed in

claim 56 wherein the cover is retractable or removable.

58. A mobile telephone carrying casing as claimed in
any one of claims 54 to 57 wherein the membrane keypad
is provided with electromagnetic radiation screening
means to attenuate electromagnetic radiation.

59. A mobile telephone carrying casing as claimed in
any one of the preceding claims wherein at least one
of the exterior surfaces of the components contains
grooves which ease gripping and thus separation of the
components of the casing.

15 60. A mobile telephone carrying casing as claimed in
any one of the preceding claims further comprising
attachment means for attaching the casing to clothing
of a user.

20 61. A mobile telephone carrying casing as claimed in
any one of the preceding claims further comprising
attachment means for attaching the casing to a belt of
a user.

25 62. A mobile telephone carrying casing as claimed in
any one of the preceding claims further comprising
attachment means for attaching the casing to a holster
located in a fixed place, such as the dashboard of a
car.

30 63. A mobile telephone carrying casing which can
encase, contain, and protect a mobile telephone
carried thereby, wherein:

35 the casing is an integer separate and independent
from the carried mobile telephone which consists

- 30 -

wholly or principally of a rigid plastics material;

the casing comprises at least two parts which can be separated to allow introduction of a mobile telephone between the parts and joined together to encase the introduced mobile telephone;

5 at least one part is provided with electromagnetic radiation screening means; and

the casing allows a user to operate the encased mobile telephone whilst carried in the casing.

10

64. A mobile telephone carrying casing as claimed in claim 63 wherein the electromagnetic radiation screening means provides a shield positioned between a head of a user and the encased mobile telephone.

15

65. A mobile telephone carrying casing as claimed in claim 63 or claim 64 wherein the electromagnetic radiation screening means causes attenuation of the electromagnetic radiation only on the side of the casing nearest a head of a user, the electromagnetic radiation being free to radiate from the remainder of the casing without attenuation.

20

66. A mobile telephone carrying casing as claimed in any one of claims 63 to 65 wherein the at least two casing parts define front and rear components, the front component encasing the front face of the mobile telephone and the rear component encasing the rear face of the mobile telephone, the components meeting in a line spaced apart from the front and rear faces of these components.

25

67. A mobile telephone carrying casing as claimed in any one of claims 63 to 66 wherein no part of the encased mobile telephone extends beyond the casing.

30

69. A mobile telephone carrying casing as claimed in any one of claims 63 to 68 wherein the electromagnetic radiation screening means is selectively incorporated
5 in one or more desired regions of the casing.

70. A mobile telephone carrying casing as claimed in any one of claims 63 to 69 wherein the electromagnetic screening means comprises a coating applied to a
10 surface of one or more of the components of the casing.

15 71. A mobile telephone carrying casing as claimed in claim 70 wherein the coating contains metallic particles.

72. A mobile telephone carrying casing as claimed in claim 71 wherein the metallic particles are nickel.

20 73. A mobile telephone carrying casing as claimed in claim 71 wherein the metallic particles are copper.

74. A mobile telephone carrying casing as claimed in claim 71 wherein the metallic particles are silver.

25 75. A mobile telephone carrying casing as claimed in claim 71 wherein the metallic particles are gold.

30 76. A mobile telephone carrying casing as claimed in claim 71 wherein the metallic particles are alloys of two or more metals.

35 77. A mobile telephone carrying casing as claimed in claim 76 wherein the metallic particles are alloys of nickel and copper.

78. A mobile telephone carrying casing as claimed in claim 76 wherein the metallic particles are alloys of nickel and silver.

5

79. A mobile telephone carrying casing as claimed in claim 76 wherein the metallic particles are alloys of nickel and gold.

10

80. A mobile telephone carrying casing as claimed in claim 76 wherein the metallic particles are alloys of copper and silver.

15

81. A mobile telephone carrying casing as claimed in claim 76 wherein the metallic particles are alloys of copper and gold.

20

82. A mobile telephone carrying casing as claimed in claim 76 wherein the metallic particles are alloys of silver and gold.

25

83. A mobile telephone carrying casing as claimed in any one of claims 70 to 82 wherein the coating is a paint.

84. A mobile telephone carrying casing as claimed in any one of claims 70 to 83 wherein the coating is sprayed on a surface of one or more components.

30

85. A mobile telephone carrying casing as claimed in any one of claims 70 to 84 wherein the coating is sprayed on an interior surface one or more components.

35

86. A mobile telephone carrying casing as claimed in any one of claims 70 to 83 wherein the coating is

- 33 -

sprayed on a plurality of surfaces of one or more components.

87. A mobile telephone carrying casing as claimed in
5 any one of claims 63 to 69 wherein the electromagnetic radiation screening comprises a mesh.

88. A mobile telephone carrying casing as claimed in
claim 87 wherein the mesh comprises a metal.

10

89. A mobile telephone carrying casing as claimed in
claim 87 wherein the mesh comprises an alloy of metal.

15

90. A mobile telephone carrying casing as claimed in
claim 87 wherein the mesh comprises a composite material.

20

91. A mobile telephone carrying casing as claimed in
any one of claims 87 to 90 wherein the mesh comprises
apertures whose maximum dimension is less than one
half of a wavelength of the smallest wavelength
electromagnetic radiation emitted by the mobile
telephone.

25

92. A mobile telephone carrying casing as claimed in
any one of claims 63 to 91 wherein the electromagnetic radiation screening means provided in the casing forms a screen between a head of a user and the sources of electromagnetic radiation in the carried mobile telephone.

30

93. A mobile telephone carrying casing as claimed in
any one of claims 63 to 92 wherein the electromagnetic radiation screening means is selectively positioned in
35 the casing so that it does not impair the function of

- 34 -

the mobile telephone.

94. A mobile telephone carrying casing as claimed in any one of claims 63 to 93 which comprises an aperture 5 for alignment with an earpiece of the mobile telephone carried thereby.

95. A mobile telephone carrying casing as claimed in any one of claims 63 to 94 which comprises an aperture 10 for alignment with a microphone of a mobile telephone carried thereby.

96. A mobile telephone carrying casing as claimed in any one of claims 63 to 95 which comprises an aperture 15 through which function keys of the carried mobile telephone are accessible.

97. A mobile telephone carrying casing as claimed in any one of claims 63 to 96 which comprises an aperture 20 through which a display screen of the carried mobile telephone can be viewed.

98. A mobile telephone carrying casing as claimed in any one of claims 63 to 66 or any one of claims 68 to 25 97 which comprises an aperture through which an antenna of the carried mobile phone can project.

99. A mobile telephone carrying casing as claimed in any one of claims 63 to 98 which comprises an aperture 30 through which the mobile telephone can be recharged.

100. A mobile telephone carrying casing as claimed in any one of claims 94 to 99 wherein at least one of the apertures is shielded with a cover.

- 35 -

101. A mobile telephone carrying casing as claimed in claim 100 wherein the cover is retractable or removable.

5 102. A mobile telephone carrying casing as claimed in claim 100 or claim 101 wherein the cover is provided with electromagnetic radiation screening means to attenuate electromagnetic radiation.

10 103. A mobile telephone carrying casing as claimed in any one of claims 63 to 102 which comprises components injection moulded from a thermoplastic.

15 104. A mobile telephone carrying casing as claimed in any one of claims 63 to 103 which has components at least partially composed of Acrylonitrile Butadiene Styrene.

20 105. A mobile telephone carrying casing as claimed in any one of claims 63 to 104 which has components at least partially composed of a polycarbonate material.

25 106. A mobile carrying casing as claimed in any one of claims 63 to 105 which comprises a membrane key pad composed of a flexible material, which overlays the keys of an encased mobile telephone and which has keys which project through apertures in the casing, thus enabling activation of the keys of the encased mobile telephone by depression of the keys of the membrane key pad.

30 107. A mobile telephone carrying casing as claimed in claim 106 wherein the membrane key pad is attached to the remainder of the casing.

- 36 -

108. A mobile telephone carrying casing as claimed in claim 106 or claim 107 wherein the membrane keypad is provided with electromagnetic radiation screening means to attenuate electromagnetic radiation.

5

109. Use of a mobile telephone carrying casing as claimed in any one of the preceding claims to encase, contain and protect a mobile telephone, the mobile telephone already having a casing which is an integral part of the mobile telephone.

10

110. A method of encasing, containing and protecting a mobile telephone, and of screening electromagnetic radiation emitted by the mobile telephone, the method comprising the steps of:

providing a carrying casing which is an integer separate and independent from the carried mobile telephone which consists wholly or principally of a rigid plastics material, the casing comprising at least two separable parts having connecting means and an electromagnetic screening means,

separating the casing into the at least two parts;

introducing the mobile telephone to be carried into one of the separated parts; and

joining the at least two parts to encase the mobile telephone and using the connecting means to secure the casing; wherein:

the method allows a user to operate the mobile telephone whilst carried in the casing; and

the electromagnetic screening means attenuates electromagnetic radiation emitted by the carried mobile telephone.

FIG. 1.

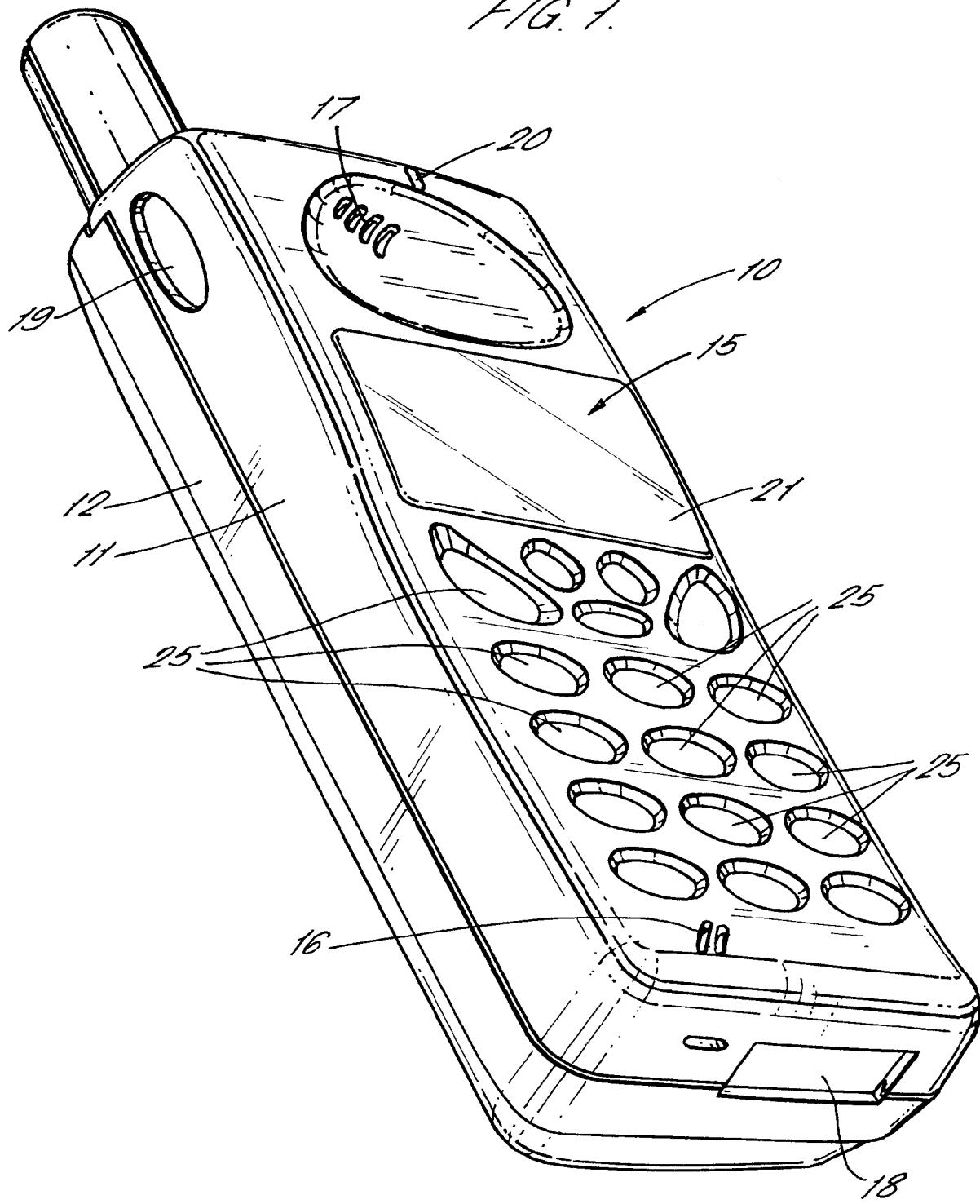
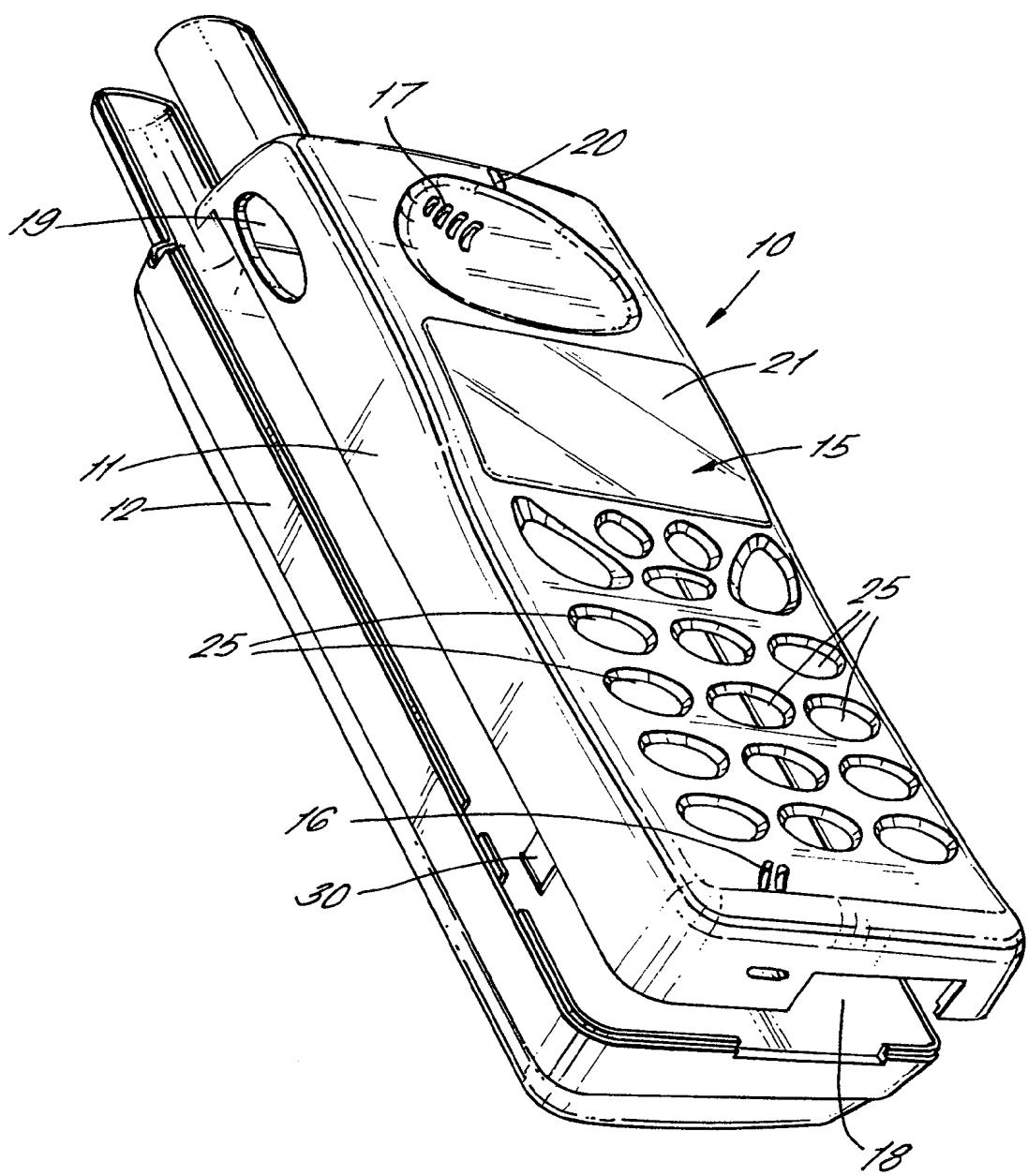


FIG. 2.



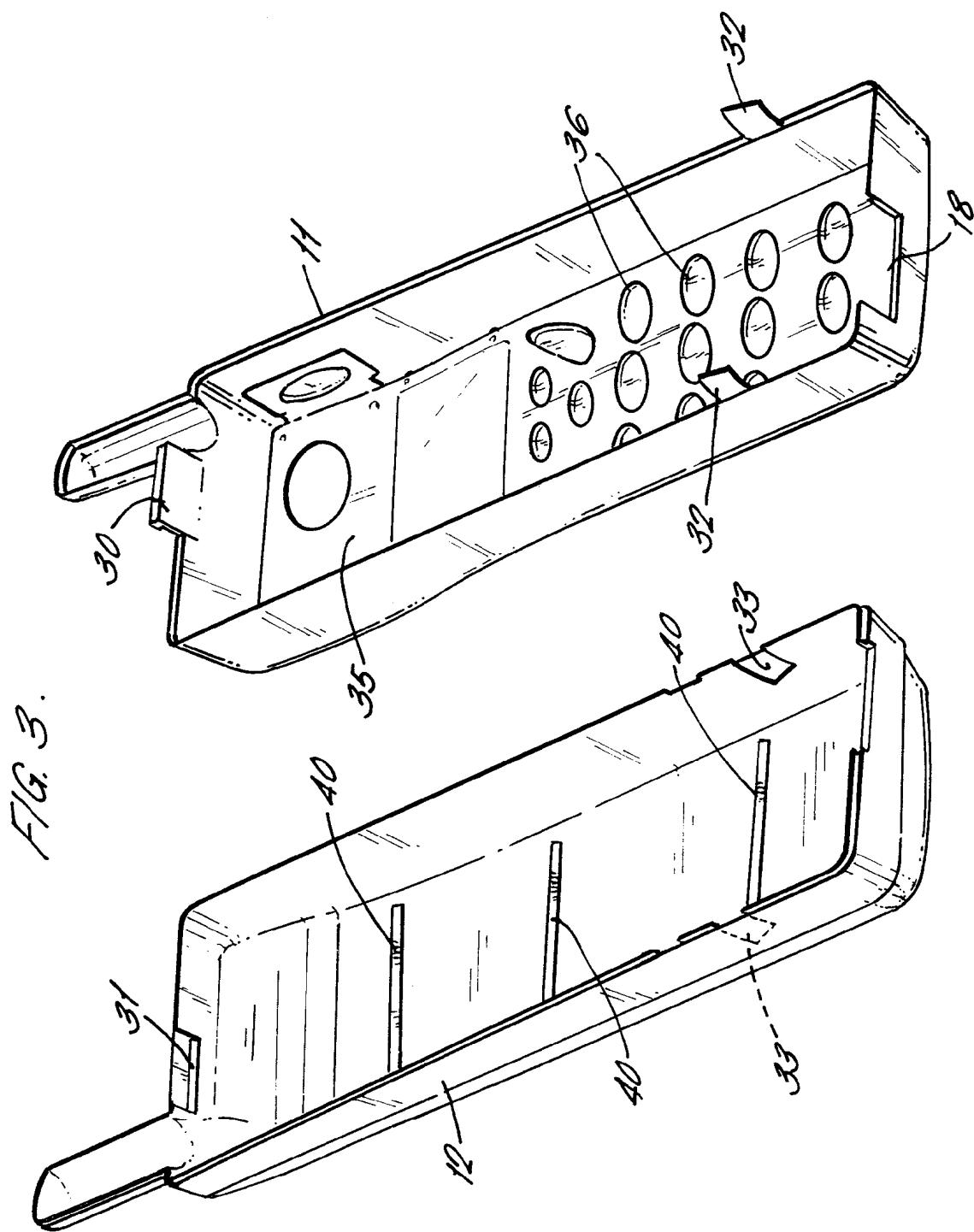
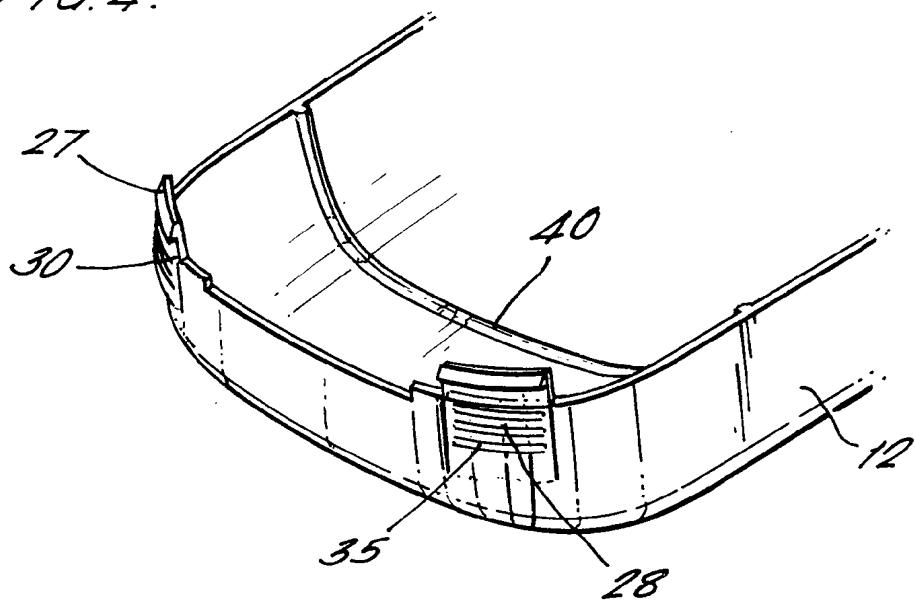
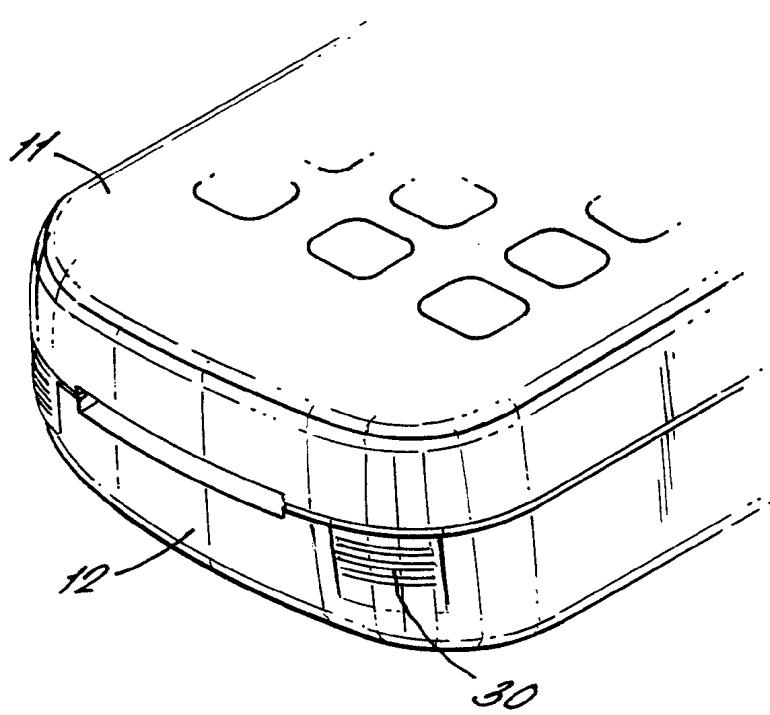


FIG. 4.*FIG. 5.*

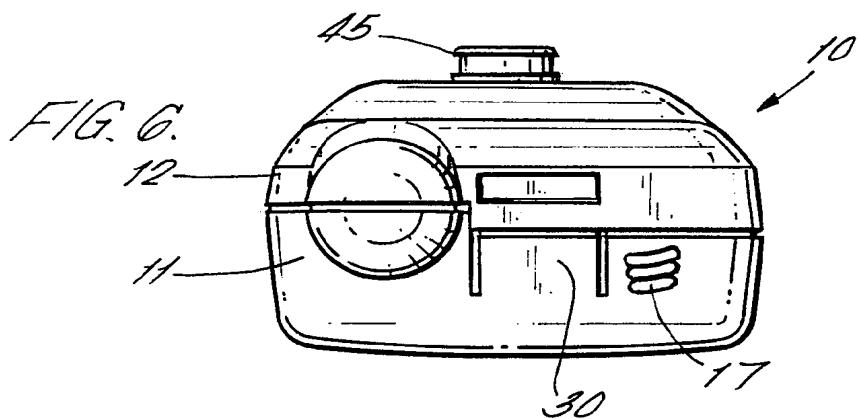


FIG. 7.

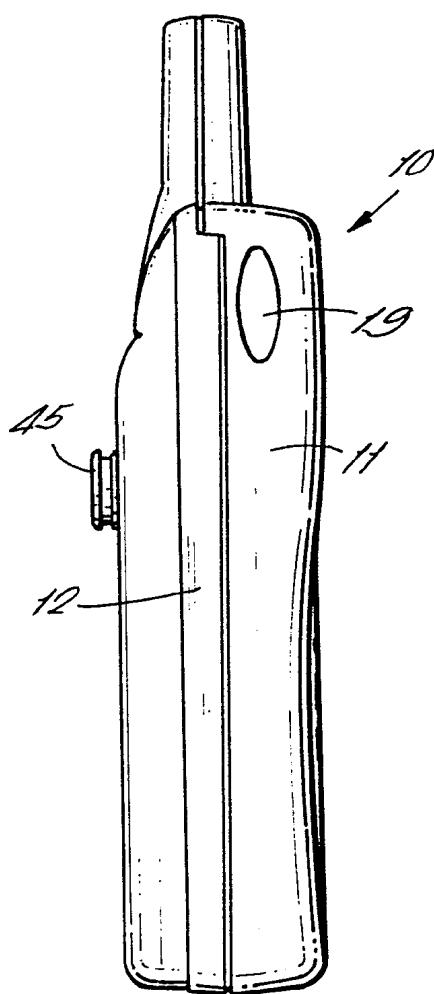
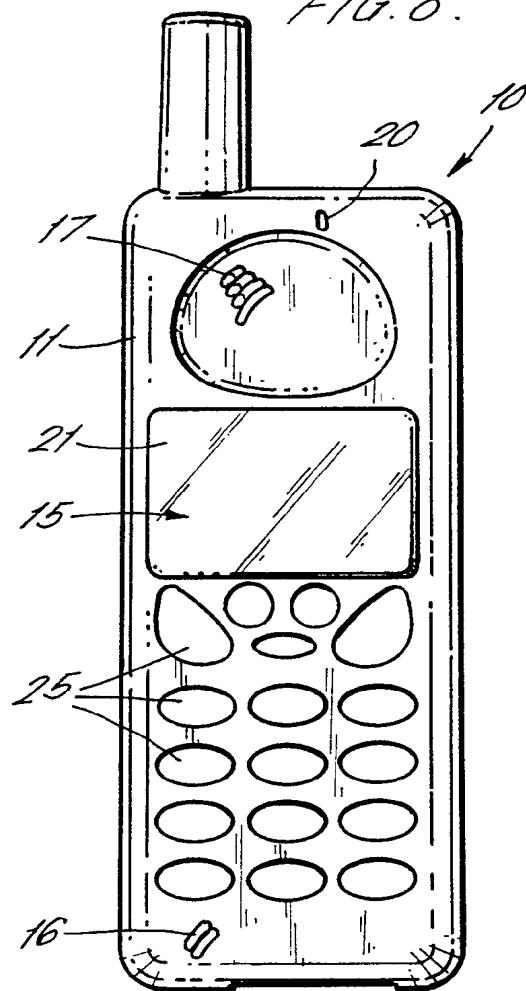


FIG. 8.



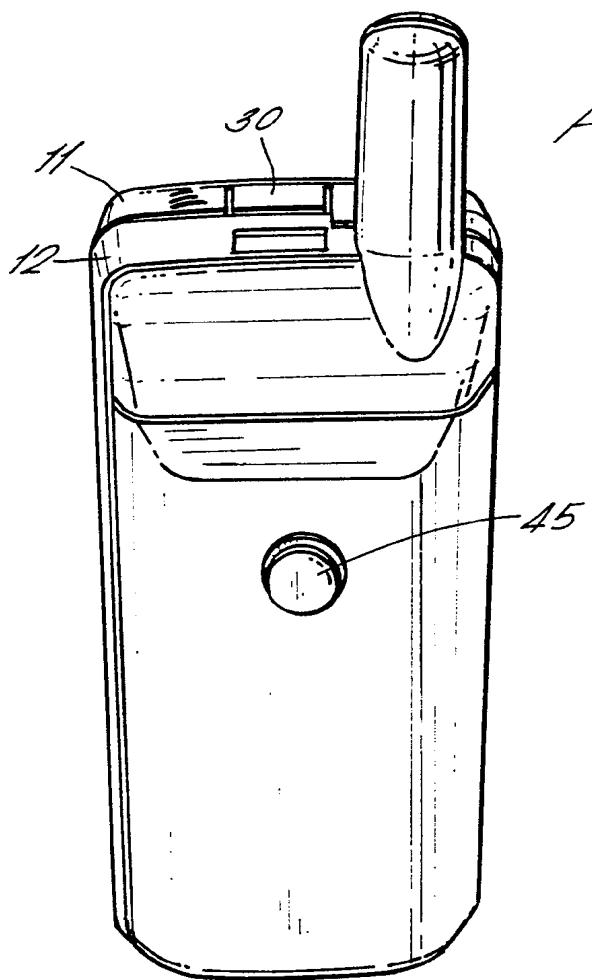


FIG. 9.

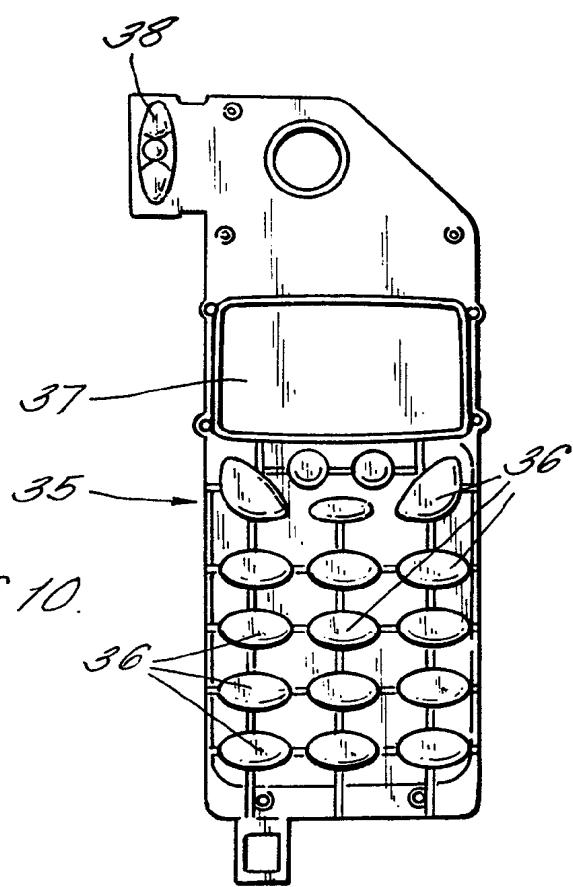


FIG. 10.

FIG. 11.

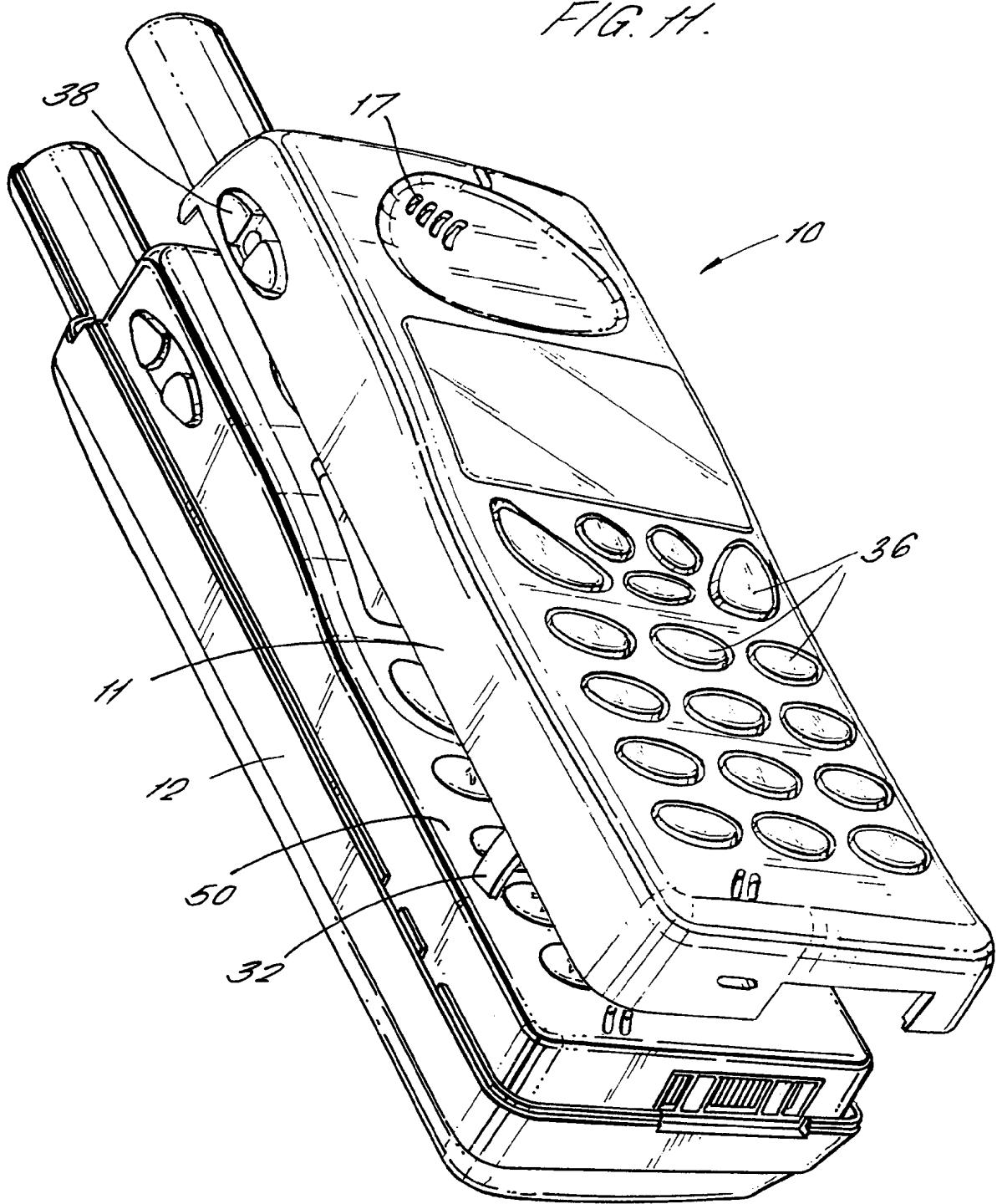
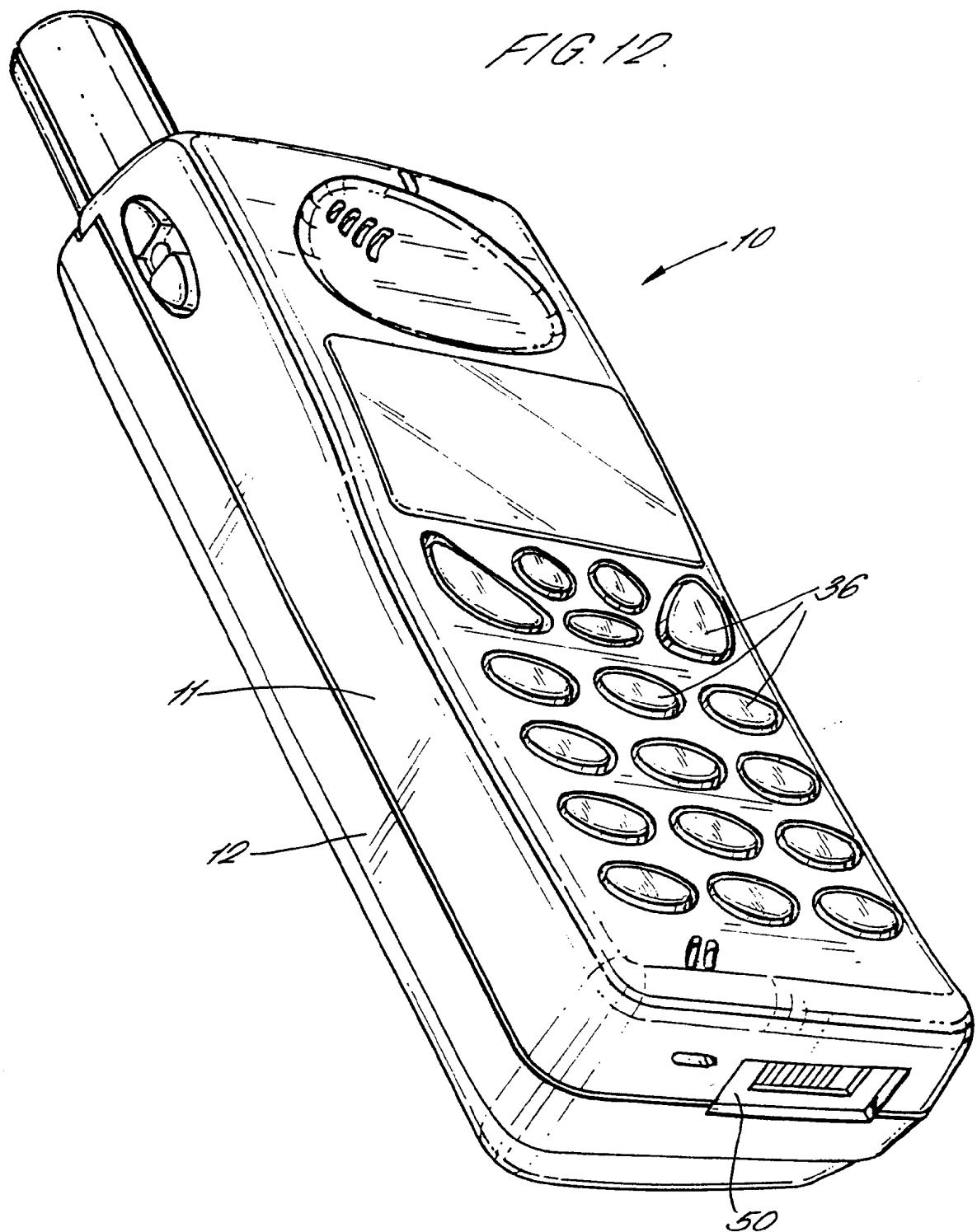


FIG. 12.



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/02873

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04B1/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 97 41717 A (GELLER URI ;PROTECTOR DEV LTD (IL); GITLIS MEIR (IL)) 6 November 1997 (1997-11-06) page 6, line 1 -page 8, line 11; figures 1-4</p> <p>---</p> <p style="text-align: center;">-/--</p>	1-4,6, 12-110

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

² Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

11 November 1999

18/11/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

Andersen, J.G.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/02873

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 196 02 706 A (HOELTER HEINZ) 31 July 1997 (1997-07-31)	1-3, 6, 8, 13-16, 18-40, 44, 63-92, 96, 109, 110
A	the whole document	4, 5, 7, 9-12, 17, 41-43, 45-62, 93-95, 97-108
Y	GB 2 302 474 A (WILSON LESLIE RONALD) 15 January 1997 (1997-01-15)	1-3, 6, 8, 13-16, 18-40, 44, 63-92, 96, 109, 110
A	page 6, line 24 -page 9, line 34; figures 2, 3	4, 5, 7, 9-12, 17, 41-43, 45-62, 93-95, 97-108
A	DE 298 07 853 U (WANG CHENG NENG) 30 July 1998 (1998-07-30)	-----

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/02873

Patent document cited in search report	Publication date	Patent family member(s)			Publication date
WO 9741717	A 06-11-1997	US 5726383 A			10-03-1998
		AU 2402497 A			19-11-1997
		DE 29723581 U			27-05-1999
		EP 0846407 A			10-06-1998
DE 19602706	A 31-07-1997	NONE			
GB 2302474	A 15-01-1997	AU 7317696 A			15-05-1997
		CN 1203709 A			30-12-1998
		EP 0857374 A			12-08-1998
		WO 9715982 A			01-05-1997
		NO 981897 A			15-06-1998
		NZ 320440 A			28-10-1999
DE 29807853	U 30-07-1998	NONE			